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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,553	10/03/2005	Toshihiko Tanaka	067161-0301	3832
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EXAMINER JELSMIA, JONATHAN G				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/551,553

**Applicant(s)**

TANAKA, TOSHIHIKO

**Examiner**

Jonathan Jelsma

**Art Unit**

1795

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 June 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 13 and 18-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 13 and 18-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## DETAILED ACTION

### *Summary*

1. This is the third office action based on application 10/551,553 and in response to Applicant's Arguments/Remarks filed 06/16/2009.
2. Claim 13 is previously pending, claim 13 has been amended, and claims 18-25 are newly added claims. Claims 13 and 18-25 are currently pending and have been fully considered.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claim 13, 19, and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over UNNO (US 5,933,219) in view of KURODA (US 2004/0080732 A1).

6. With respect to claims 13 and 19. UNNO teaches a device manufacturing method for forming a semiconductor device (column 1 lines 8-12). UNNO teaches a reticle, or mask, with a pattern on it, that is provided in an exposure apparatus projecting onto a resist coated wafer (column 3 lines 10-18). An illumination system radiates light through the reticle to pattern the wafer (column 3 lines 15-18). An image of the circuit pattern on the reticle is formed then on the wafer using the linearly polarized light, to achieve the exposure of the wafer (column 3 lines 47-51). The wafer after exposure may then be subjected to development process to form a semiconductor device (column 4 lines 1-2). The reticle may include patterns such as 22, and 26 which are larger in a first direction, or the x-direction, than a second direction such as the y-direction (column 4 lines 36-45, see Fig. 2). The light is linearly polarized in the x-direction (column 4 lines 44-45). These patterns may form a hole.

7. UNNO does not explicitly teach that the pattern formed by the reticle patterns such as 22 and 26 form a pattern substantially the same width in the first and second directions. However, KURODA teaches a photomask with slit and light shield portions on a photomask (paragraph 0116). The mask exposes a photoresist using the photomask with the rectangular lattice pattern, to form a latent image pattern formed in the resist as a pattern of dots arrayed in the form of a rectangular lattice (paragraph 0116). This latent image has a size of about 30nm x 30 nm, and so therefore has substantially the same size in the first and second direction (paragraph 0017). Further as can be in figure 2, the polarized electric field is in the direction of the long part of the lattice pattern of the photomask.

8. At the time of the invention one having ordinary skill in the art would have been motivated to make the rectangular patterns of KURODA with the pattern substantially the same width in the first and second direction using the mask pattern of KURODA and UNNO because KURODA teaches that using such a mask pattern allows the intensity of near field light through the pattern opening to increase as well as to increase throughput (paragraph 0015).

9. With respect to claims 22-23. Neither UNNO nor KURODA explicitly teaches that the opening has a ratio between 1.2 and 2 or more specifically approximately 1.6. Paragraph 0116 of KURODA teaches different dimensions for the mask. However, KURODA does not explicitly teach that these ratios are explicitly 1.6. KURODA does teach that the slits are longer in the direction of the incident light (figure 2). The exact dimensions of these slits may be determined as a matter of routine experimentation in order to achieve the desired resist pattern and dimensions such as those taught by KURODA (paragraph 0117).

10. Claims 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over UNNO (US 5,933,219) in view of KURODA (US 2004/0080732 A1) and SASAKI (US 6,685,848).

11. Claims 18 and 20 are dependent upon claim 13, which is rejected above under 35 U.S.C. 103(a) in view of UNNO and KURODA. However, neither UNNO nor KURODA explicitly teaches that the pattern is a substantially round hole pattern, or that the mask has a halftone region.

12. SASAKI teaches an example of where the photomask used has a hole pattern to be transferred to the wafer (column 15 lines 36-37). This hole pattern may additionally be formed on a half-tone phase shift mask to have a very small dimensional difference between the coarse and dense portion of the hole patterns (column 15 lines 40-42).

13. At the time of the invention one having ordinary skill in the art would have been motivated to use the semiconductor production method of UNNO and KURODA to have the mask pattern of the hole pattern on a half tone phase shift mask as taught by SASAKI in order to transfer the desired pattern and achieve very small dimensional difference between the coarse and dense portions (SASAKI column 15 lines 40-42).

14. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over UNNO (US 5,933,219) in view of KURODA (US 2004/0080732 A1) and LIN (US 2002/0168593 A1).

15. Claim 21 is dependent upon claim 13 which is rejected above in view of UNNO and KURODA. However, neither UNNO nor KURODA explicitly teaches that the first direction provides S polarized illumination, and second direction has P polarized illumination.

16. KURODA teaches a polarizer<sup>9</sup> that polarizes the light in the desired direction (paragraph 0074). Additionally LIN teaches polarizing S polarization light for the Y direction which would be the direction such as described in Figure 2 of KURUDA, and then using P polarized light for the other direction (figures 3-4A and paragraph 0025).

17. At the time of the invention one having ordinary skill in the art would have been motivated to use S polarized illumination for the polarized illumination of UNNO and

KURODA with P polarization being orthogonal to that, in order to adjust for optical proximity correction as taught by LIN (paragraph 0018).

18. Claims 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over UNNO (US 5,933,219) in view of KURODA (US 2004/0080732 A1), SASAKI (US 6,685,848) and NAKAO (US 2002/0155395 A1).

19. Claims 24-25 are dependent upon claim 10, which is rejected above under 35 U.S.C. 103(a) in view of UNNO, KURODA, and SASAKI. SASAKI teaches that the mask may comprise attenuating region, however SASAKI does not explicitly teach that this mask has an attenuated region of 2% to 25% or pore specifically about 6%.

20. NAKAO however teaches that the halftone region of a mask may be from 2% to 10% which may be approximately 6% (claim 7).

21. At the time of the invention one having ordinary skill in the art would have been motivated to use the transmission of the attenuating layer as taught by NAKAO of approximately 6% in the mask of UNNO, KURODA and SASAKI since NAKAO teaches that approximately 6% may function with predictable results in a mask with use of polarization device.

### ***Response to Arguments***

22. Applicant's arguments, see page 5 of Applicant Arguments/Remarks, filed 06/16/2009, with respect to the rejection(s) of claim(s) 13 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn.

However, upon further consideration, a new ground(s) of rejection is made in view of UNNO and KURODA.

23. On page 5 of Applicant Arguments/Remarks, Applicant argues that UNNO does not teach the amended claim limitation where the pattern is substantially the same width in said first and second directions. This argument is persuasive. However, new grounds of rejection have been made in view of KURODA.

24. Specifically KURODA teaches a mask as seen in figure 2 which has a mask pattern which has an opening larger in a first direction than a second, where it is wider in the direction of the polarized light, this mask is then used to create a pattern in the photoresist that has substantially the same width in the first and second directions.

### ***Conclusion***

25. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

26. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of



the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Jelsma whose telephone number is (571)270-5127. The examiner can normally be reached on Monday to Thursday 7:00 a.m. - 4:00 p.m.

28. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

29. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/  
Supervisory Patent Examiner, Art Unit 1795

JGJ